

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	DA 15-1426
)	
Amendment of the Commission's Rules with)	
Regard to Commercial Operations in the)	
3550-3650 MHz Band)	GN Docket No. 15-319
)	
)	GN Docket No. 12-354
)	

Re: Proposal of Comsearch for Certification as a SAS Administrator and ESC operator;
Request for Supplemental Information (GN Docket 15-319)

To: Marlene H. Dortch
Office of the Secretary, Federal Communications Commission

**SUPPLEMENT TO
COMSEARCH PROPOSAL
TO BE DESIGNATED AS A
SPECTRUM ACCESS SYSTEM ADMINISTRATOR AND
ENVIRONMENTAL SENSING CAPABILITY OPERATOR**

In response to FCC inquiry in the above-captioned proceeding¹, and the FCC's request for supplemental information, Comsearch hereby submits this supplement to our proposal to develop and manage an independent Spectrum Access System (SAS) and Environmental Sensing Capability system (ESC).

¹ See *Wireless Telecommunications Bureau and Office of Engineering and Technology Establish Procedure and Deadline for Filing Spectrum Access System (SAS) Administrator(s) and Environmental Sensing Capability (ESC) Operator(s) Applications* GN Docket No. 15-319 (DA 15-1426) (Public Notice) 30 *FCC Rcd* 14170 (2015), and *Report and Order And Second Further Notice of Proposed Rulemaking*, (Order) GN Docket No. 12-354, 30 *FCC Rcd* 3959, 80 *FR* 34119 (2015)

Introduction

Comsearch welcomes the opportunity to submit this supplemental information to the Commission in support of our proposal to be designated as a Spectrum Access System administrator and Environmental Sensing Capability operator. While we believe we have addressed all of the Commission's questions as detailed below, we welcome the opportunity to engage the Commission in additional discussion as needed.

Comsearch Response to FCC Questions

As stated in our initial proposal, Comsearch is able to perform all of the duties and responsibilities of the SAS and ESC administrator outlined in the Public Notice. To help simplify our response, we have shown below each question from the Commission's request with our response below:

1. WTB/OET recently released a Public Notice establishing the final methodology for determining Grandfathered Wireless Protection Zones. Please update your proposal to describe how your SAS will protect Grandfathered Wireless Broadband Licensees accordingly. (§96.53(m))

The Public Notice states that the Grandfathered Wireless Protection Zones will be determined by the Commission based upon information provided by the Grandfathered Wireless Broadband Licensees to the Commission through the ULS. The Commission will then communicate the Protection Zones to the SASs. If a base station is taken out of service the licensee will be required to delete the registration and the FCC will communicate to the SASs

that the base station is no longer in service and that station's Grandfathered Wireless Protection Zone will no longer be protected.²

Comsearch will protect Grandfathered Wireless Broadband Licensees by not allowing CBSD operation within the Grandfathered Wireless Protection Zones. Considering aggregate power protection, we will ensure that the aggregate power of co-channel CBSDs is no greater than -80 dBm/10 MHz at any point inside the Protection Zone for CBSDs controlled by the Comsearch SAS. This will be done by calculating the aggregate interference of all nearby CBSDs, determining the aggregation margin, and ensuring that aggregate power of our SAS-controlled CBSDs does not exceed the -80 dBm/10 MHz threshold.

We will also incorporate guidelines suggested by the WinnForum as feasible.

2. Comsearch states that it expects to incorporate most of the WinnForum recommendations and guidelines in its solutions to become SAS/ESC operator. Specifically indicate which WinnForum reference documents and standards they will use and discuss whether Comsearch has any modifications above and beyond of those proposed by WinnForum. Comsearch should be specific on the proprietary solutions or methods that deviates them from WinnForum recommendations. (pg. 3)

We reiterate that we expect to incorporate most of the WinnForum recommendations and specifications in our SAS solution. Below is a list of the specific WinnForum documents we have been using in our design. We do not expect to depart appreciably from these requirements. Since the interface between SAS and ESC is not defined in WinnForum, Comsearch is developing a proprietary interface which is outlined in our responses to questions 7 and 8 below.

² See *Wireless Telecommunications Bureau and Office of Engineering and Technology Announce Methodology for Determining the Protected Contours for Grandfathered 3650-3700 MHz Band Licensees*, GN Docket No. 12-354, Public Notice, 2016 WL 4432651 (Aug. 19, 2016), at ¶¶ 20 & 21.

List of WinnForum Documentation

WINNF-16-S-0096-V0.5.0	Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS); Spectrum Access System (SAS) - SAS Interface Technical Specification	Sep. 2016
WINNF-16-S-0016-V0.5.3	Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS); Spectrum Access System (SAS) - Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification	Sep. 2016
WINNF-16-P-0020-V0.6.0	Receiver Performance Technology	Sep. 2016
WINNF-16-P-0003-V1.0.0	SAS to SAS Interface Technical Report-B	Apr. 2016
WINNF-16-P-0004-V0.4.0	Overview of Wireless Innovation Forum Test and Certification Process and Plans	Jan. 2016
WINNF-16-I-0182	PAL and PPA Descriptions, Definitions, and Requirements v1	Aug. 2016
WINNF-15-S-0112-V1.0.3	Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band	Sep. 2016
WINNF-15-S-0065-V1.0.0	CBRS Communications Security Technical Specification	Jul. 2016
WINNF-15-S-0071-V1.0.0	CBRS Operational Security Technical Specification	Jun. 2016
WINNF-15-S-0112-V1.0.0	CBRS Operational and Functional Requirements	May 2016
WINNF-15-P-0089-V1.0.0	CBRS Threat Model Technical Report	May 2016
WINNF-15-P-0062-V1.0.0	SAS to CBSD Protocol Technical Report-B	Mar. 2016
WINNF-15-P-0051-V1.0.0	SAS to SAS Interface Technical Report-A	Jan. 2015
WINNF-15-P-0047-V1 0 0	SAS Functional Architecture Prsn	Sep. 2015
WINNF-15-P-0060-V1.0.0	SSC WG4 Certification Process	Oct. 2015

3. Please affirm that the CBSDs are subject to current and future international agreements with Mexico and Canada, and that Comsearch will implement the terms of these agreements as they relate to CBSDs. (§§ 96.19, 96.53(n))

Comsearch affirms that CBSDs are subject to current and future international agreements with Mexico and Canada, and that we will implement the terms of these agreements as they relate to CBSDs.

4. How will Comsearch make CBSD registration information available to general public but obfuscate identities of the licensees? (pg. 23) (§ 96.55(a)(3))

Comsearch will make CBSD registration information available to the general public through a web interface to the registration database. Access to this interface will require registration, login and password and will be managed consistent with CommScope IT Security Policy and Standards.³

The registration data displayed in this interface will not include identifying information for the specific licensee. The specific information that will be displayed is still being deliberated within the WinnForum.

5. Please explain in detail how the SAS will calculate and enforce PAL protection areas and ensure consistent enforcement across all SASs. (§ 96.57(e))

The WinnForum WG1 PAL Task Group (PAL TG) has been working for several months on how to calculate and enforce PAL Protection Areas (PPAs) and ensure consistent enforcement across all SASs. The PAL TG has created the document, “SSC WG1 WINNF-16-I-0182: PAL and PPA Descriptions, Definitions, and Requirements v1” for descriptions, definitions and requirements for PALs and PPAs from the Task Group. This will ultimately be incorporated into the WinnForum full requirements document.

Comsearch intends to follow these recommendations as they relate to PPAs and consistent enforcement across all SASs. To the extent we diverge from these requirements, we will notify the Commission accordingly.

³ Comsearch SAS Filing, pp35-37

6. Comsearch states while it will rely on fees to support its operations, it still is developing the business modelling for providing SAS and ESC services. Please provide more detail regarding fee structure and acknowledge that the Commission, upon request, will review SAS fees and can require changes to those fees if they are found to be unreasonable. (pg. 28) (§ 96.65)

Comsearch intends to charge fees to allow CBSDs to have access to our SAS and use our SAS/ESC services. However, our service plans and associated fee structure are still under development. We will provide the Commission with full information regarding our fee structure upon completion.

We acknowledge that the Commission, upon request, can review our SAS fees and can require changes to those fees if they are found to be unreasonable. We will also fully comply with §96.65.

We note that Comsearch manages several FCC-specified registration/database access systems that are subject to FCC fee review including our 70-80-90 GHz Link Registration Database. In all cases, our fee structures have been subject to FCC review similar to §96.65.

7. In its application, Comsearch indicates that it will provide more detail as it develops ESC design and network approach. Comsearch also states that it is developing its approach to signal detection, sensor protection and resiliency, data safeguarding and retention, and operational assurance. In addition, Comsearch points out that it is developing its approach to inter-sensor communication and security of ESC interfaces. Comsearch should elaborate on all these aspects of its ESC design, incumbent data protection and data retention. The proposal should clearly demonstrate how federal stations are protected from interference while ESC is deployed and operating. (pgs. 39-40) (§ 96.67)

Comsearch notes that the DoD, Navy and FCC are still developing testing and certification guidelines for ESCs.⁴ In addition, WinnForum is working with stakeholders to develop T&C guidelines within the WG4 ESC certification TG.⁵ We are developing our ESC

⁴ “DoD Draft Requirements for 3550 MHz Environmental Sensing Capability Test and Certification”

⁵ Wireless Innovation Forum, Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band, Document WINNF-15-S-0112, Version V1.0.0, 12 May 2016, page 28, section R2-ESC-08.

design to meet the requirements developed by WinnForum in collaboration with DoD, Navy and the FCC.

The ESC architecture will follow the guidance given from Winnforum, as shown in

Figure 1 where an ESC Decision System will receive the state information or sensing results from the ESC sensors.

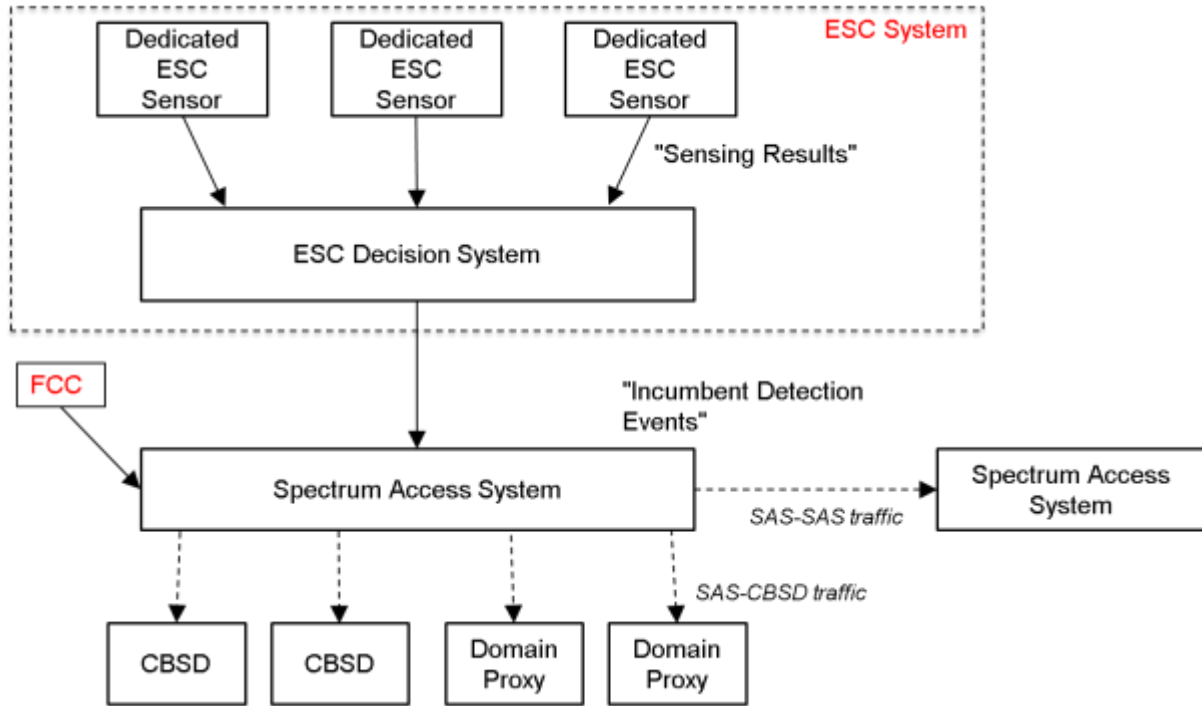


Figure 1 ESC Architecture

For the ESC sensor, Comsearch has identified the hardware platform which is an SDR operating in the 3550-3700MHz frequency band. The SDR will have enough flexibility so that adaptation can be made if there are changes in the nature of the incumbent. In SDR architecture, RF front end, ADC and Digital Down-Conversion (DCC) circuitry is responsible for continuously monitoring, digitizing and down-converting RF signals in the 3550-3700MHz frequency band. The down converted IQ data stream is continuously processed by a signal processing block that applies signal detection and estimation algorithms consisting of Primary

and Secondary processing stages. This two-staged processing scheme statistically minimizes processing time by applying higher computational load algorithms only when needed on the basis of energy and spectral characteristics of the received signal. Based on our experience on developing signal detection for location measurement units for mobile wireless applications, we are applying our proprietary signal processing algorithm in stages to detect federal incumbent radars. The detection algorithm is designed and will be tested so that it can detect DoD Radar within the allotted 60s time window with high probability as set forth by the requirements in WinnForum.

Comsearch is also in the process of developing simulation environment where the detection algorithm of incumbent signal will be tested when the sensor is subject to EMI from CBRS in the vicinity.

The Comsearch SAS will also manage the aggregate EMI from neighboring CBSDs so that the interference from neighboring CBSD at the ESC sensor does not cross the power threshold required for optimal detection of federal incumbent signal. Our SAS will also communicate with other SASs so that CBSD managed by other SASs also do not cause aggregate interference beyond the threshold required for optimal detection of federal incumbent signal. Comsearch RF engineers will utilize RF propagation and site planning tools to determine optimal ESC sensor location zones and antenna heights.

Additional information on our ESC sensor and network capabilities is provided below:

Sensor Protection and resiliency:

- Sensor shall have tamper-detection circuitry to detect if an intrusion occurs.
- Ethernet shall be the only external sensor interface, minimizing the interfaces that an intruder to may use to gain access

- Sensor shall support IP-67 environmental requirements and work under industrial temperature ranges.
- Sensor shall have front-end protection and fast attack AGC to protect it against strong (up to 1 GWatt), possible line of sight, transmit power from incumbent radar.
- Sensor shall employ lightning protection on its antenna and power inputs to minimize the change that lightning will damage the sensor.

Data safeguarding and retention:

- Both the ESC Sensor and ESC Core shall not permanently store any measurement data.
- All detection results provided by the sensor shall be transferred to the ESC core over an encrypted channel.
- Full ESC detection records shall not be retained within the ESC core for a time past the cessation of incumbent activity longer than the detection time figure of merit plus any additional randomized deactivation period determined by the ESC.

Operational assurance:

- ESC Core and Sensor shall support SNMP alarm traps to allow easy monitoring of the health/status of the ESC system.
- ESC sensors shall include a test function, including the ability to transmit to periodically confirm operational status.
- ESC core and sensors shall be field upgradeable to allow installation of security patches and possible application updates.

Inter-sensor communication:

- Comsearch does not plan to implement inter-sensor communication

Security of ESC interfaces:

- The ESC (Core and Sensor) shall support PKI (public key infrastructure) and shall encrypt all communication using TLS 1.2 and a strong cipher suite such as TLS_RSA_WITH_AES_128_GCM_SHA256. This shall occur on all external and internal ESC interfaces.

8. Please provide a detailed description of the SAS-ESC communication protocol and the parameters which are exchanged between the ESC and SAS. If a proprietary protocol is used, at a minimum provide the information exchanged between the ESC function and the SAS function. All ESC-SAS communication interfaces, including proprietary, will be tested. As a combined SAS-ESC applicant, Comsearch should provide and explain detail testing interfaces to ensure all ESC and SAS requirements, including that data transmission can be conducted securely. (pgs. 24-25) (§ 96.61(b); 96.63(d))

Information on our SAS-ESC communications is provided below:

Information Exchanged Between ESC and SAS:

- The following information shall be sent from ESC to SAS:
 - ESC health information, including the health/status of all ESC sensors.
 - A list of all incumbent protected census tracts/frequency combinations. This information will be obscured to minimize the chance that an incumbent radar signal may be tracked using this information. Obscuring will take the form of a random number of adjacent frequency and census tracts added to the list of protected census tracts, frequencies.
- The following information shall be sent from the SAS to ESC:
 - Census tract database. ESC requires this database for its obscuring function. The SAS has the responsibility of keeping its census tract database up to date and shall push it to the ESC when there are any changes.

- All interfaces SAS/ESC shall be encrypted.
- The SAS/ESC communication protocol will likely use HTTPS/TLS and will be similar in structure to the SAS-CBSD protocol defined by WinnForum.

ESC Testing:

- Thorough test plans shall be developed to ensure that all SAS and ESC requirements are met.
- The ESC and SAS shall be designed with test modes and/or interfaces as necessary to perform the required acceptance testing in lab as well as field environments.

9. Comsearch states that it has one of the most accurate databases on FSS incumbents, and also works closely with the licensees in the 3650 MHz Wireless Broadband Service. In addition, Comsearch articulates that it may elect to augment the datasets using their proprietary databases as an additional verification of interference protection. We request Comsearch to describe, using its accurate database, how the SAS will ensure that non-federal FSS earth stations and grandfathered 3650-3700 MHz licensees are protected from harmful interference consistent with the rules. Please describe how Comsearch will obtain annual registration for each FSS earth station. (pgs. 32-33) (§§ 96.17; 96.17(d))

At this point, Comsearch intends to implement our SAS solution using exclusively the FCC-provided data as described in Pt. 96 and in the SAS PN. To the extent that we decide to deviate from that approach using any other databases, we will inform the Commission and provide complete description of how our SAS will utilize such databases.

10. Describe the protocols the SAS will use in order to directly interface with any FCC database containing information required for SAS operations. Describe the process the SAS will use in order to respond to instructions from the President of the United States or another designated federal government entity. (pg. 26) (§§ 96.63(k); 96.63(l))

Comsearch expects to interface with the FCC databases similar to the processes established for TV White Space (TVWS). For TVWS, this includes the Equipment

Authorization System (EAS), ULS and Consolidated Database System (CDBS). We interface with the EAS through an FCC-supplied API, which is implemented through the REST protocol. For the ULS and CDBS, we perform regular downloads of these databases and upload the data into our databases. We will work with the FCC establish similar interfaces and protocols to access the databases required for CBRS.

We will comply with 96.63(l) (47 U.S.C. 606) through the implementation of an interface to allow the FCC (or other designated government entity) to access the SAS and perform required functions consistent with 47 U.S.C. 606.

Conclusions

Comsearch is pleased to submit our follow-up responses to the Commission's questions. As we have stated throughout our initial filing and reiterated in our responses herein, much of the requirements and guidelines are still being developed within the WinnForum. In addition, the FCC's guidelines for SAS and ESC testing certification are also still being developed with all stakeholders. Comsearch is an active participant in all of these efforts.

Respectfully Submitted,

/s/ H. Mark Gibson

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